

HUMAN SPACEFLIGHT SYMPOSIUM (B3)

Flight & Ground Operations of HSF Systems – Joint Session of the Human Spaceflight and Space Operations Symposia (4-B6.5)

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ADAPTING COLUMBUS OPERATIONS AND PROVIDING A BASIS FOR FUTURE ENDEAVOURS

Abstract

On 15th December 2015, Timothy Peake – the 4th ESA astronaut in 20 months – headed into orbit for a 6 month stay on the ISS. The British astronaut’s “Principia” mission holds many interesting tasks, not only for Tim Peake himself (he performed an EVA on 15th January 2016) but also for the teams on the ground. One of the most exciting activities is the second session of the Airway Monitoring experiment, which will again include an experiment run in the US airlock under Col-CC coordination. Besides that, there will be many other experiments, such as EML, PK4, DOSIS and Meteron, and also the transition to new NASA tools (e.g. WebAD) is foreseen in this period. Since the establishment of ESA’s new contractual service structure in July 2015, Col-CC has been working together with all its partners to define the new interfaces, to exploit new possibilities, and to define in detail the tasks for the operations teams. Besides the ongoing work to monitor and command Columbus, support the ESA experiments on the ISS, as well as supporting the ESA astronaut himself, Col CC is looking forward towards potential future tasks and challenges. Based on many years of experience in human space flight, an initial study was launched to investigate some of the challenges of human space flight activities beyond Earth orbit.

One of these challenges is the delay of communication transmissions experienced over long distances. Until now, all our human space flight operations have been based on (near) real-time communications to monitor and control spacecraft. This paper describes the results of our study investigating the necessary changes to current operations in the case of long-distance communications. Example procedures are assessed on their reliance on real-time communications and thus how current operations would be impacted by transmission delays. Methods are proposed to make the procedures tolerant to delays, and enable operations to use these procedures for deep space missions.